

Abstract

The Washington State Department of Health developed a Fecal Pollution Index (FPI) to show status and trends in fecal pollution in Puget Sound. I use the FPI to show status of fecal pollution in Puget Sound shellfish growing areas. I also rank South Puget Sound shellfish growing areas according to fecal pollution impact in 2008, and show eleven-year (1998-2008) trends in six growing areas with extensive histories of remedial action (Burley Lagoon, Henderson Inlet, Nisqually Reach, Eld Inlet, Oakland Bay, and North Bay).

DOH uses criteria set by the National Shellfish Sanitation Program (NSSP) to classify shellfish growing areas:

- Criterion 1: Concentrations of fecal coliform bacteria in water samples shall not exceed a geometric mean value of 14 organisms per 100ml of sample.
- Criterion 2: The estimated ninetieth percentile of fecal coliform shall not exceed 43 MPN per 100ml.
- A minimum of 30 previously collected results are needed to calculate the criteria.
 - Both criteria must be met.

DOH cannot approve a harvest area if significant pollution sources are present even if water quality is acceptable.

How is the Annual Fecal Pollution Index (FPI) calculated?

- Calculate the estimated 90th percentile statistic for all sampling stations in the growing area for each sampling date during the year.
- Sort the estimated 90th percentiles from each station into categories:
“GOOD” [90th percentiles ≤ 30 mpn/100ml; column (b) in Table 1]
“FAIR” [30 mpn/100ml < 90th percentiles ≤ 43 mpn/100ml; column (c)]
“BAD” [90th percentiles > 43 mpn/100ml; column (d)]
- For each station, divide the number in each category by the total number of sample dates to determine the fraction of 90th percentiles in each category [columns (f) – (h)].
- “Weight” each fraction by multiplying it by a weighting factor:
“GOOD” fractions × 1.00 [column (i)]
“FAIR” fractions × 2.00 [column (j)]
“BAD fractions” × 3.00 [column (k)]
- Add the weighted fractions. The sum is the fecal pollution index for each station [column (l)]. The FPI will range from 1.00 (100% of 90th percentiles are GOOD) to 3.00 (100% of 90th percentiles are BAD). (For example, the annual FPI for Station 278 in 2008 was 2.25).
- To calculate the annual FPI for the entire growing area, sum the numbers in each category for all stations in the growing area (last row in Table 1), and repeat the calculations described above. The annual FPI for all stations in Filucy Bay in 2008 was 2.05.

(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)
STATION	NUMBERS				FRACTIONS			WEIGHTED FRACTIONS			FPI
	GOOD	FAIR	BAD	TOTAL	GOOD	FAIR	BAD	GOOD	FAIR	BAD	
274	8	0	4	12	0.67	0.00	0.33	0.67	0.00	1.00	1.67
275	0	0	12	12	0.00	0.00	1.00	0.00	0.00	3.00	3.00
276	12	0	0	12	1.00	0.00	0.00	1.00	0.00	0.00	1.00
278	0	9	3	12	0.00	0.75	0.25	0.00	1.50	0.75	2.25
279	0	8	4	12	0.00	0.67	0.33	0.00	1.33	1.00	2.33
TOTAL FB	20	17	23	60	0.33	0.28	0.38	0.33	0.57	1.15	2.05

Table 1 summarizes the FPI analysis for Filucy Bay 2008.

Figure 1 uses 2008 FPIs to show the spatial distribution of fecal pollution in Filucy Bay in 2008.

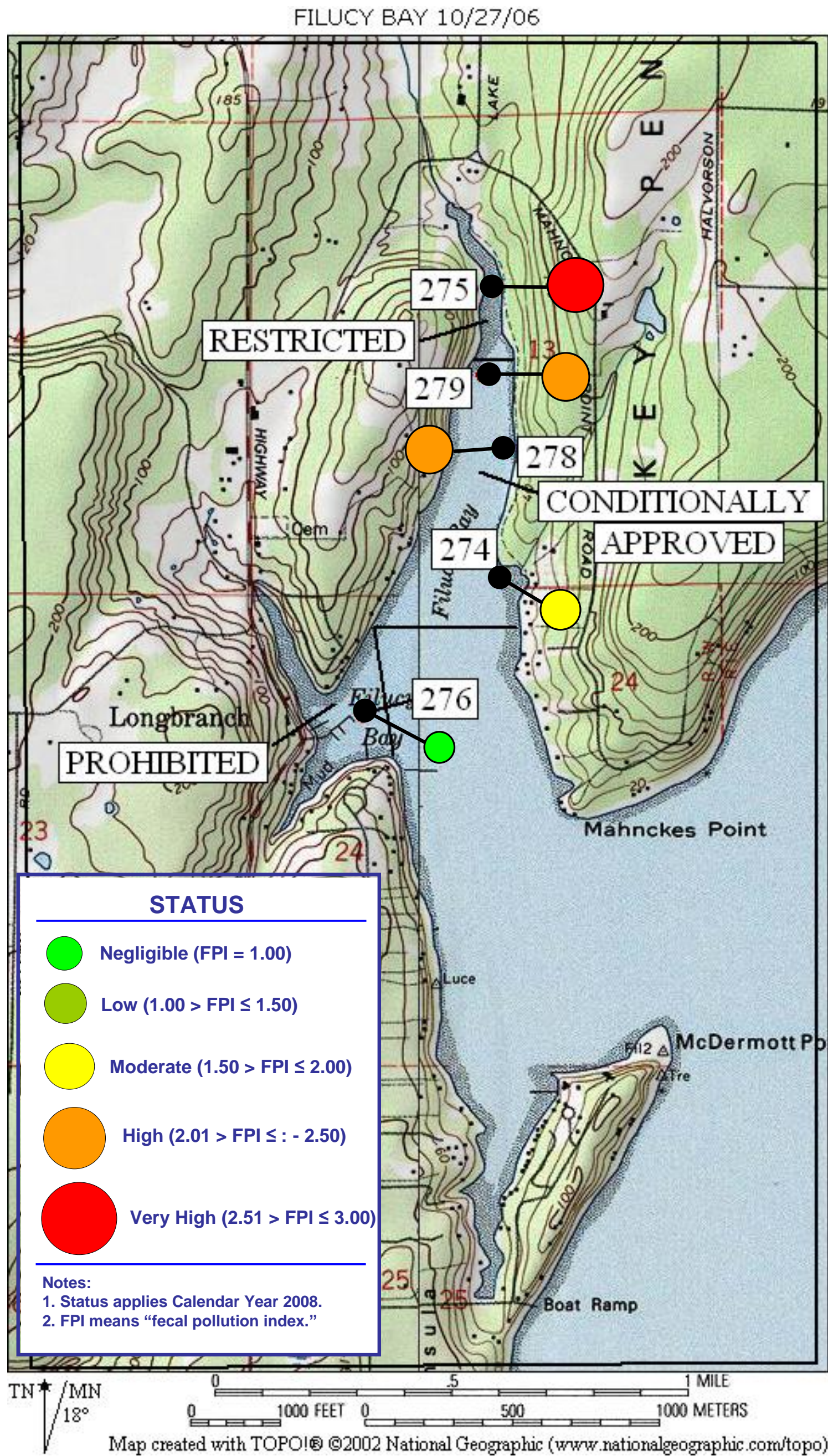


Figure 2 describes fecal pollution impact in South Puget Sound shellfish growing areas in 2008. Inset bar graph shows ranking of South Puget Sound areas by fecal pollution impact (FPI) in 2008.

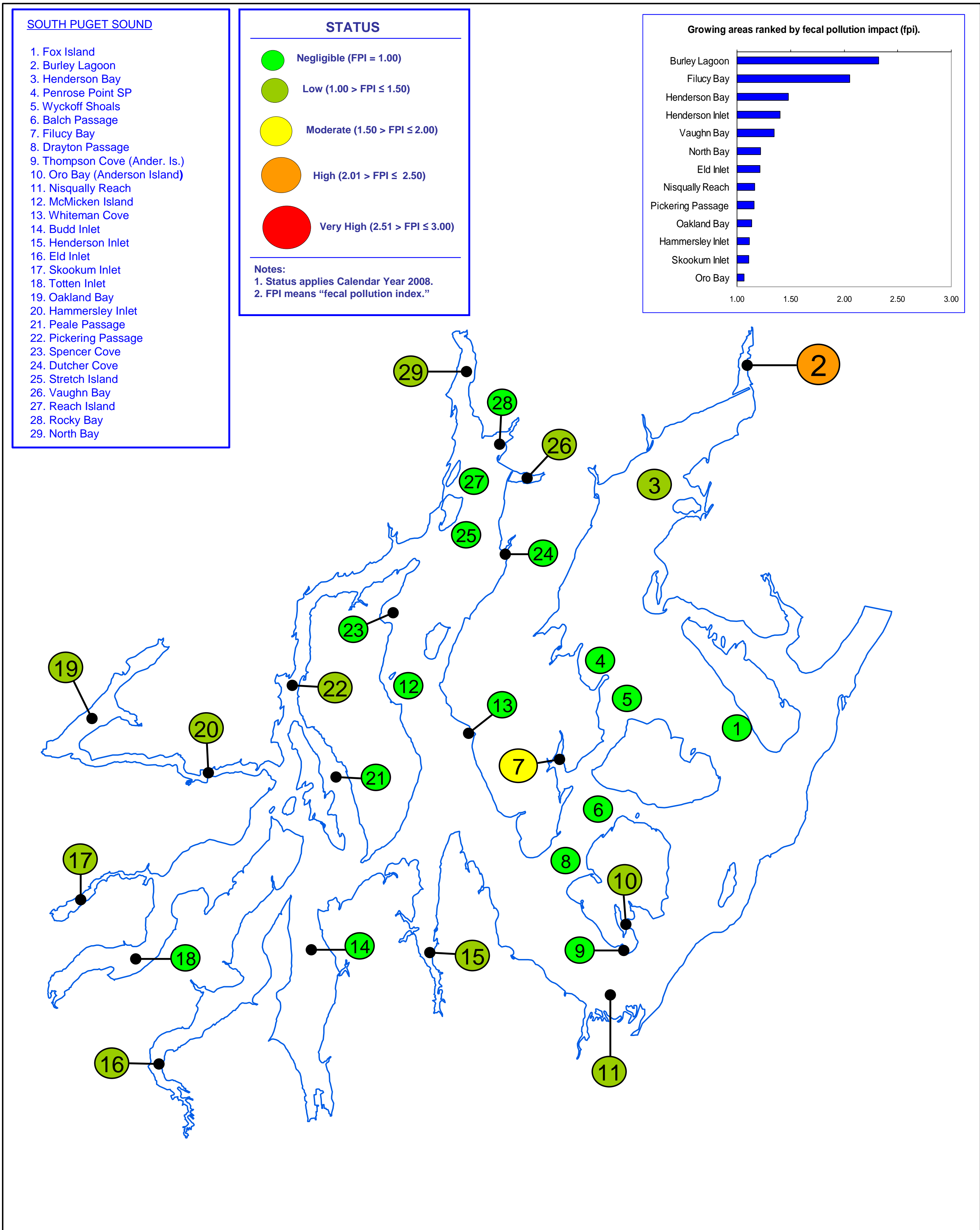


Figure 3 shows 11-year trend (1998 -2008) in fecal pollution in six shellfish growing areas suffering moderate or greater fecal pollution in Puget Sound during 2007. Graphs are numbered according to location of areas on Figure 2.

